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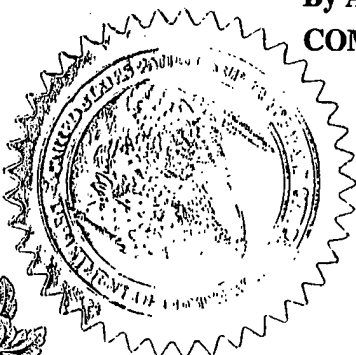
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APPLICATION NUMBER: 60/567,235

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Approved for use through 07/31/2008. OMB 0651-0032

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

EL 404578651 US

U.S. P
607567235

INVENTOR(S)			
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Anton	Krijnen	Beverly HOLLAND	
Additional inventors are being named on the _____ separately numbered sheets attached hereto			
TITLE OF THE INVENTION (500 characters max)			
SLIP ELEVATOR			
Direct all correspondence to: CORRESPONDENCE ADDRESS			
<input type="checkbox"/> Customer Number: _____			
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ENCLOSED APPLICATION PARTS (check all that apply)			
<input checked="" type="checkbox"/> Specification Number of Pages <u>8</u>		<input type="checkbox"/> CD(s), Number _____	
<input checked="" type="checkbox"/> Drawing(s) Number of Sheets <u>12</u>		<input checked="" type="checkbox"/> Other (specify) <u>Complete Extra Set Drawings</u>	
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76			
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT			
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.		FILING FEE Amount (\$)	
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees.		<input type="checkbox"/> The Director is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: _____	
<input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.		<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.	
		<div style="border: 1px solid black; padding: 5px; display: inline-block;">160⁰⁰</div>	

The Commissioner is hereby authorized to charge any fees under 37 CFR 1.16 and 1.17 which may be required by this filing to Deposit Account No. 13-0195. Please show our docket number with any charge or credit to our Deposit Account. A copy of this letter is enclosed.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

(Page 1 of 2)

Respectfully submitted,

SIGNATURE

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Date:

REGISTRATION NO.

(if appropriate)

Docket Number:

1 May 2004
29,008
DQ 016

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PROVISIONAL APPLICATION COVER SHEET
Additional Page

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Docket Number

DD D16

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[Page 2 of 2]

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Krijnen et al

Filed: Herewith (1 May 2004)

Serial No.:

§ Art Unit:

§

§ Examiner:

§

§ Atty File: DQ 016

For: Slip Elevator

PROVISIONAL APPLICATION - U.S.

☒ 12 sheets of drawings

☒ Certificate of Express Mail No. EL 404578651 US

☒ Return Postcard

☒ Specification, total 8 pages + 12 sheets drawings

☒ Extra set of DRAWINGS complete

☒ Executed Form PTO 2038 for \$160 for the filing fee is enclosed.

☒ Two-page PTO Form PTO/SB/16 [modified]

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1 May 2004
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IN THE UNITED STATES PATENT
AND TRADEMARK OFFICE

PROVISIONAL APPLICATION FOR
UNITED STATES PATENT

SLIP ELEVATOR

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SLIP ELEVATOR

BACKGROUND OF THE INVENTION

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Field Of The Invention

1. This invention is directed to elevators for use in derrick and wellbore operations; and, in one particular aspect, to an elevator with powered slips for engaging a tubular.

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Description of Related Art

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2. Many prior art drilling systems have a rotary drive, and/or a top drive, a supportive rig floor, a derrick extending vertically above said rig floor, and a traveling block which can be raised and lowered within said derrick. During drilling operations, such rig equipment is often used to insert and, in some cases remove, tubular goods from a well. Drill bits and/or other equipment are often lowered into a well and manipulated within a tubular drill pipe. Once a well has been drilled to a desired depth, large diameter pipe called casing is often installed in the wellbore and cemented in place in order to provide structural integrity to the well and to isolate downhole formations from one another.

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3. Tubulars such as casing, drill pipe or other pipe are typically installed in a number of sections of roughly equal length. These pipe sections, often called "joints," are typically installed one at a time, and screwed together or otherwise joined end-to-end to make a roughly continuous length of pipe. In order to start the process of inserting pipe in a well, a first joint of pipe is lowered into the wellbore at the rig floor, and suspended in place using a set of "lower slips." Such lower slips are often wedge-shaped dies which can be inserted between the outer surface of said pie and the bowl-like inner profile of the rotary table. Such lower slips hold the weight of the pipe and suspend the pipe

in the well. Although such lower slips can be automated, in many applications such lower slips are manually inserted and removed by rig personnel.

4. To install pipe into a well, a first joint of pipe is generally inserted into a well and positioned so that the top of said joint of pipe is located a few feet above the rig floor. A rig crew or a pipe handling machine grabs a second joint of pipe, lifts said second joint of pipe vertically into the derrick, positions said second joint above the first joint which was previously run into the well, and "stabs" a male or "pin-end" thread at the bottom of said second joint into a female or "box-end" thread at the top of the first joint. The second joint is then rotated in order to mate the threaded connections of the two joints together. Then a set of elevators attached to the traveling block in the rig derrick is typically lowered over the top of the second (i.e., upper) joint of pipe. Such elevators have a central bore which is aligned with the uppermost end of the joint of pipe. The pipe is received within the central bore of the elevators. Once the elevators have been lowered over the pipe a desired distance, slips within such elevators can be activated to latch or grip around the outer surface of said joint pipe. Depending on the length of the second joint of pipe, this can often occur 40 feet or more above the rig floor.

5. Upon proper latching and engagement of the elevator slips around the body of the pipe, the traveling block and elevators are raised to take weight off of the lower slips. The lower slips can then be removed. Once the lower slips are removed, the entire weight of the pipe string is suspended from the elevator slips. The pipe can then be lowered into the well by lowering the traveling block. After the second or upper joint of pipe is lowered a sufficient distance into the well, the lower slips are again inserted in place near the rig floor. The process is repeated until the desired length of pipe (i.e., the desired number of joints of pipe) is inserted into the wellbore. This same

process can be utilized for many different types and sizes of pipe whether small diameter drill pipe or large diameter casing. The entire weight of the pipe can be held or suspended by the elevators and by the elevator slips. This pipe can be very heavy, especially when many joints of large diameter and/or heavy-wall casing are being run into a well. Accordingly, it is important that the elevator slips be properly latched around the uppermost section of pipe in the derrick to ensure that the pipe remains securely positioned within the elevators. If the pipe is not properly secured within the elevators, it is possible that the pipe drop or fall out of the elevators, causing damage to the rig or the well, or injury to rig personnel.

6. A female or box-end threaded connection of a joint of pipe can include an "upset," whereby the connection has a larger outer diameter than the rest of the pipe body. In other instances, pipe joints are joined together using internally threaded couplings; such couplings also have a larger outer diameter than the remainder of the pipe body. In either case, care must be taken to ensure that elevator slips, which are designed to engage against the outer surface of a pipe body (as opposed to the coupling or connection upset), are indeed aligned with said pipe body. If the elevator slips are inadvertently closed against a coupling or connection upset, the slips likely will not fully contact or engage against the outer surface of the pipe. This is true even when the slips are partially aligned with a connection upset or coupling. As a result, slips (including elevator slips) which are not properly engaged against a pipe body may not grip the pipe securely. If the slips do not grip the pipe securely, the slips may not be able to support the weight of the pipe string, and the pipe can fall out of the slips. Incorporated fully herein by reference are U.S. Patents 6,626,238 B2; 6,073,699; 5,909,768; 5,84,647; 5,791,410; 4,676, 312; 4,604,724; 4,269,554; 3,882,377; 6,494,273; 6,568,479; 6,536,520 B1; and 6,679,333 B2.

7. There has long been needs, recognized by the present

inventors, for efficient and effective slip-type elevators for wellbore operations.

8. To one of skill in this art who has the benefits of this invention's realizations, teachings, disclosures, and suggestions, other purposes and advantages will be appreciated from the following description of certain preferred embodiments, given for the purpose of disclosure, when taken in conjunction with the accompanying drawings. The detail in these descriptions is not intended to thwart this patent's object to claim this invention no matter how others may later disguise it by variations in form, changes, or additions of further improvements.

DESCRIPTION OF THE DRAWINGS

9. A description of embodiments of the invention may be had by references to the embodiments which are shown in the drawings which form a part of this specification. These drawings illustrate certain preferred embodiments and are not to be used to improperly limit the scope of the invention which may have other equally effective or legally equivalent embodiments.

10. Fig. 1A is a side view of an elevator according to the present invention. Fig. 1B is a side view partially in cross-section of the elevator of Fig. 1A.

11. Fig. 2A is a top view of the elevator of Fig. 1A. Fig. 2B is a cross-section view along line 2B-2B of Fig. 1A. Fig. 2C is a cross-section view along line 2C-2C of Fig. 2B.

12. Fig. 3A is a perspective view of the elevator of Fig. 1A. Fig. 3B is a rear perspective view partially in cross-section of the elevator of Fig. 1A.

13. Figs. 4 - 7 are partial cross-section views of the elevator Fig. 1A.

14. Fig. 8 and 11 are schematic views of a system according to the present invention.

15. Fig. 9 is a graphical representation of a sequence of a

method according to the present invention.

16. Fig. 10 is a chart of parts of the elevator of Fig. 1A.

17. Fig. 12 is a perspective view of the elevator of Fig. 1A.

18. Fig. 13 is a partial cut-away view of the elevator of

5 Fig. 1A.

**DESCRIPTION OF EMBODIMENTS PREFERRED
AT THE TIME OF FILING FOR THIS PATENT**

10 19. As shown in the attached drawing figures, an elevator 10 according to the present invention is an hydraulic operated slip-type elevator which can handle tubulars and pipe with little or no upset or offset and tubulars that are flush or near-flush over their entire length. The elevator 10 is a double-door design.

15 20. The elevator 10 may be used to hoist pieces or sections of pipe up and down a derrick and is suspended from a set of links, which are suspended, e.g., by a Top Drive or Hook. The elevator 10 is able to hold and hoist sections of pipe that show no or very small external upsets or load shoulders and, in one particular
20 aspect, can be used to run a string to a maximum string weight of 250 short tons, and can handle pipe sizes (O.D.) from 2 3/8" to 7 5/8".

21. A body 12 transfers a hoist load to slips 14, either directly or through the doors. In one particular aspect the slips
25 have an optional tapered outer contour. Hoisting a load also introduces a spreading force from the slips to the body and doors 33, 34. A latch 16 keeps the doors 33, 34 closed in order to withstand this spreading force. The latch 16 also prevents the doors 33, 34 from inadvertent opening due to operational mechanical
30 shocks etc.

22. The slips 14 are operated up and down hydraulically. The power down force on the slips is high enough to create an initial penetration of inserts 14A on the slips into a pipe, preventing the pipe from slipping through the slips and allowing the buildup of

the downward hoist load. The power down force, in certain aspects, is high enough to withstand upward pipe loads up to 5 tons (push down function of elevator). The power up force is high enough to release the slips from the pipe and to overcome the friction between the slips and the body/doors, but be kept as low as possible to prevent inadvertent rising of the slips when hoisting pipe.

23. A "doors closed and slips set" signal is provided. The elevator 10 is designed such that the change of getting a false signal is eliminated. Elevator door closed and latch closed feedback uses pilot ports and positive signals from a latch valve. Slip set feedback by means of double signal of slips set sequence and pressure build up; and the above feedback signal results in a very reliable elevator closed and latched and in a slip set signal (XP) to the drillers console. Optionally, the elevator 10 can be tilted by a rotator on the link to allow picking up pipe from or laying pipe down on the V-door.

24. The major load bearing components of the elevator 10 are the body 12; doors 33, 34; latch 16; and hinge pine 18. An hydraulic control manifold 20 provides needed hydraulic connections, inputs, outputs, and access thereto. In certain aspects the slips 14 have six slip ranges: $2 \frac{3}{8}$ " - $2 \frac{7}{8}$ "; $2 \frac{7}{8}$ " - $3 \frac{1}{2}$ "; $3 \frac{1}{2}$ " - $4 \frac{1}{2}$ "; $4 \frac{1}{2}$ " - $5 \frac{1}{2}$ "; $5 \frac{5}{8}$ " - $6 \frac{5}{8}$ "; $6 \frac{5}{8}$ " - $7 \frac{5}{8}$ ".

25. In one normal method of operation in an elevator close sequence, the system pressure is about 2000 - 2500 PSI, with XP at 0 PSI. When SP = 0 PSI, the elevator close sequence starts with closing the door and the latch will close when the signal port of the door cylinder is pressurized. When the latch valve is activated the slips start clamping the pipe. The feedback signal XP (1000 PSI) that the elevator is closed and the slips are set, will be given when the pressure builds up to 1500 PSI or higher. In one aspect the elevator is equipped with a rotator and a float signal is given to the rotator when the latch valve is actuated.

26. In an elevator open sequence, the system pressure P is about 2300 PSI, XP is about 2500 PSI (XP in this aspect is 200 PSI higher than P to have a reliable operation). An XP signal is sent to the elevator and the elevator open sequence starts with activating the slip actuators in. When the pipe load is released from the slips, the slips travel up by the spring force, the latch goes open, and the door opens when the signal port of the latch cylinder is pressurized. The elevator stays open until XP is high.

As shown in Figs. 8 and 11, in one aspect of a system with an elevator 10, a control system ("CONTROL SYSTEM") interfaces with the doors, the slips, the latch and their respective operation mechanisms and this control system controls a fluid power supply through the fluid power lines to these items. These fluid power lines are manifolded in the hydraulic control manifold ("HYD. CONTROL MANIFOLD"). Pilot sensing lines to each item provide the various signal port accesses and signals (e.g., doors open, doors closed, slips set, slips disengaged, latch open, latch shut, door cylinder pressurized, feedback signal, float signal, etc.). Appropriate valves and access mechanisms are used on each line to selectively permit control system access thereto and fluid signal transmission therefrom.

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Fig. 1A

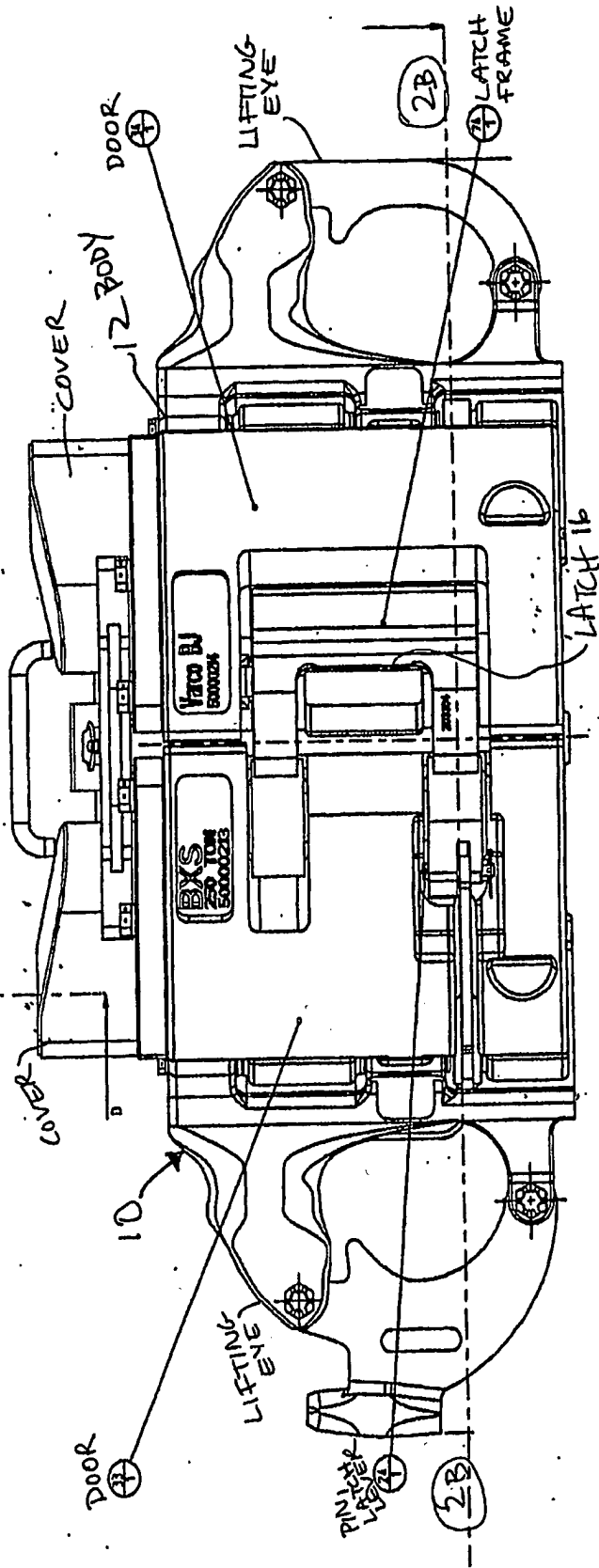


Fig. 1B

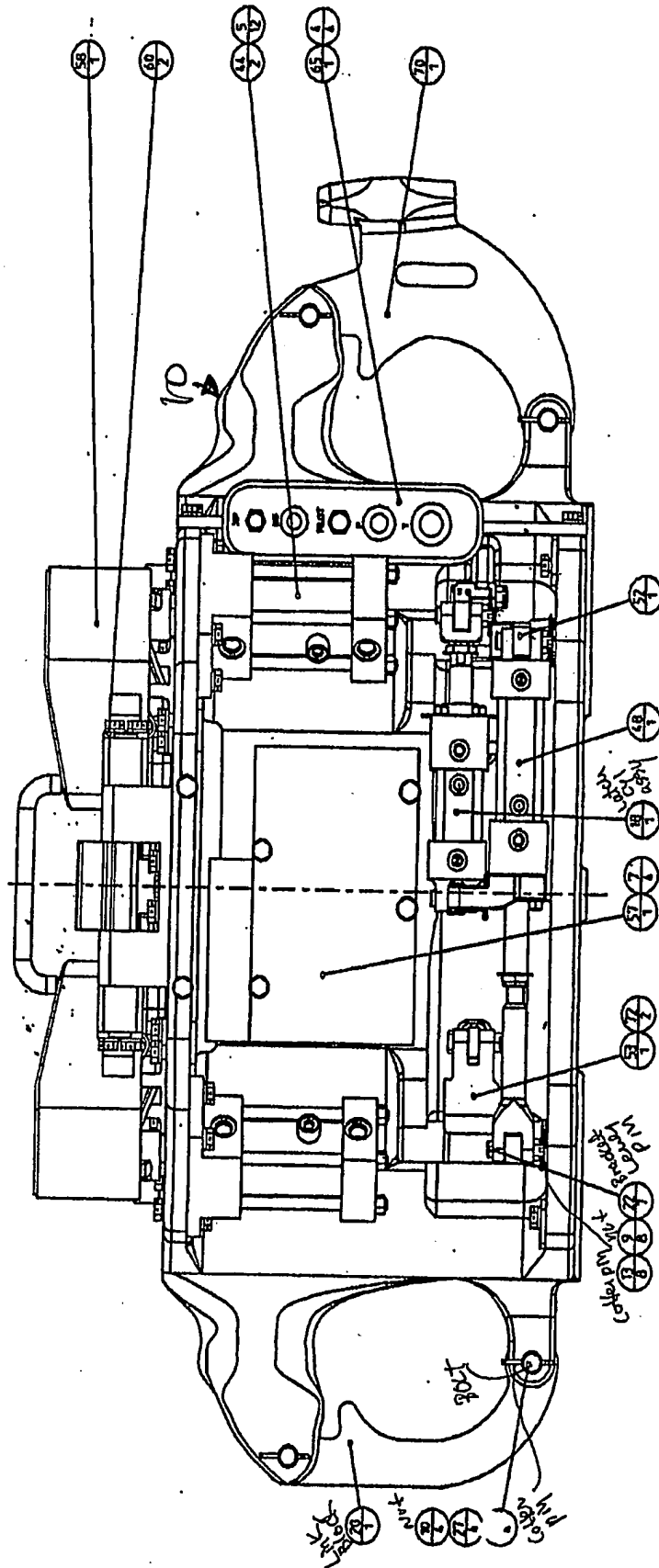
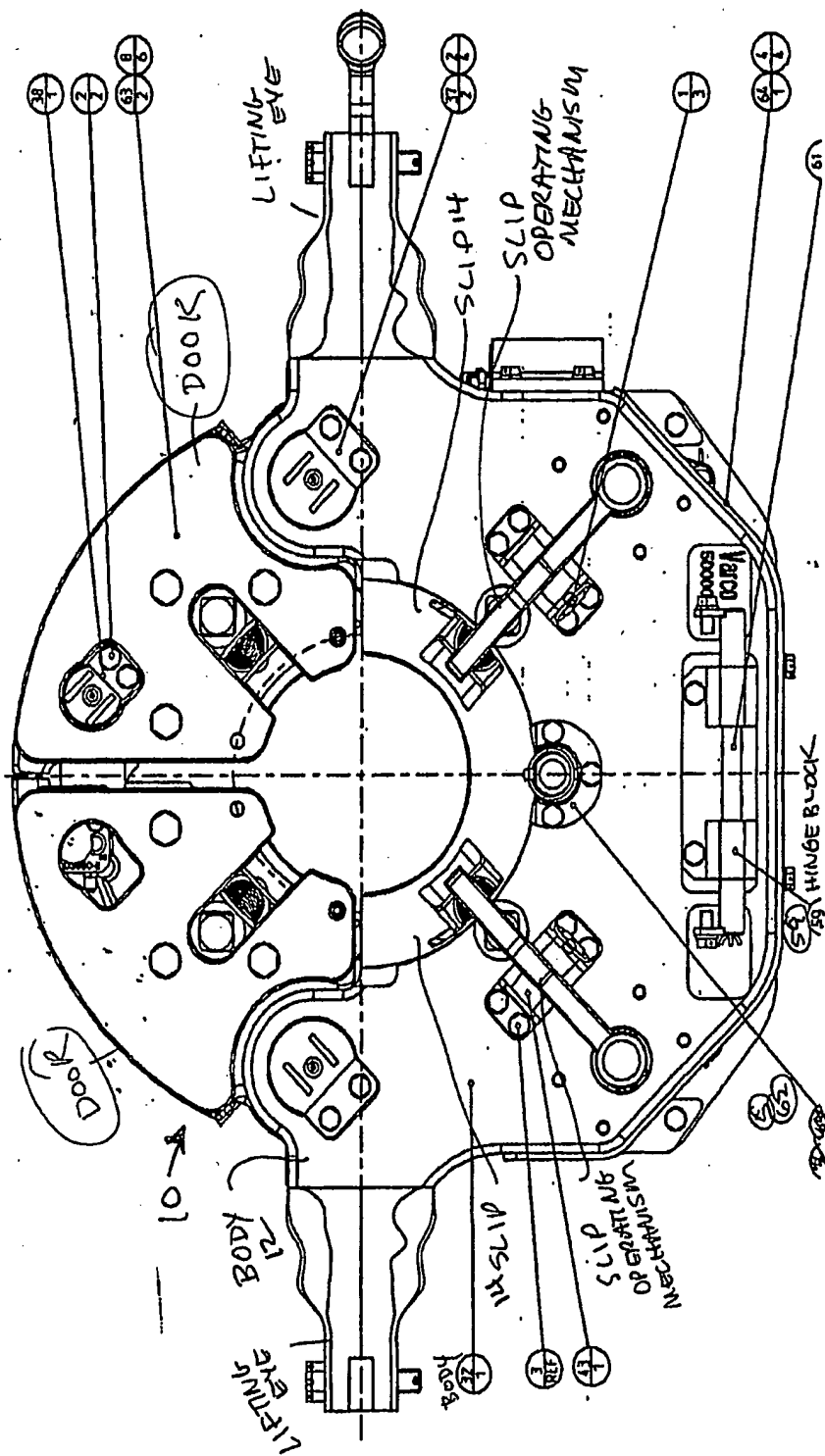


Fig. 2A

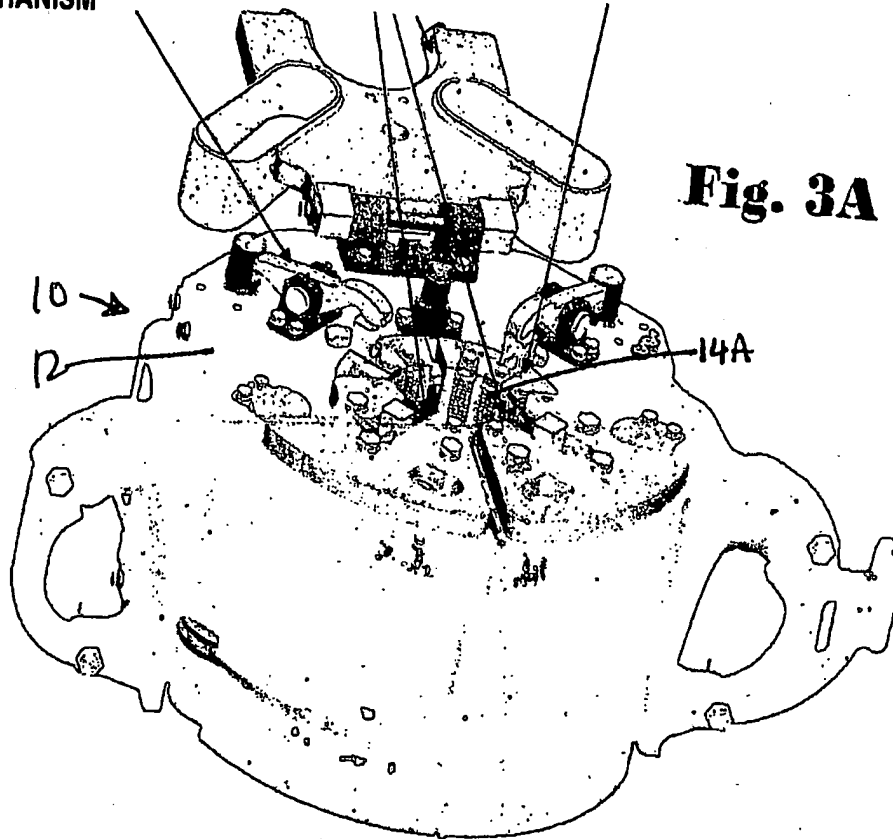


SLIPS OPERATING
MECHANISM

PIPE GUIDE

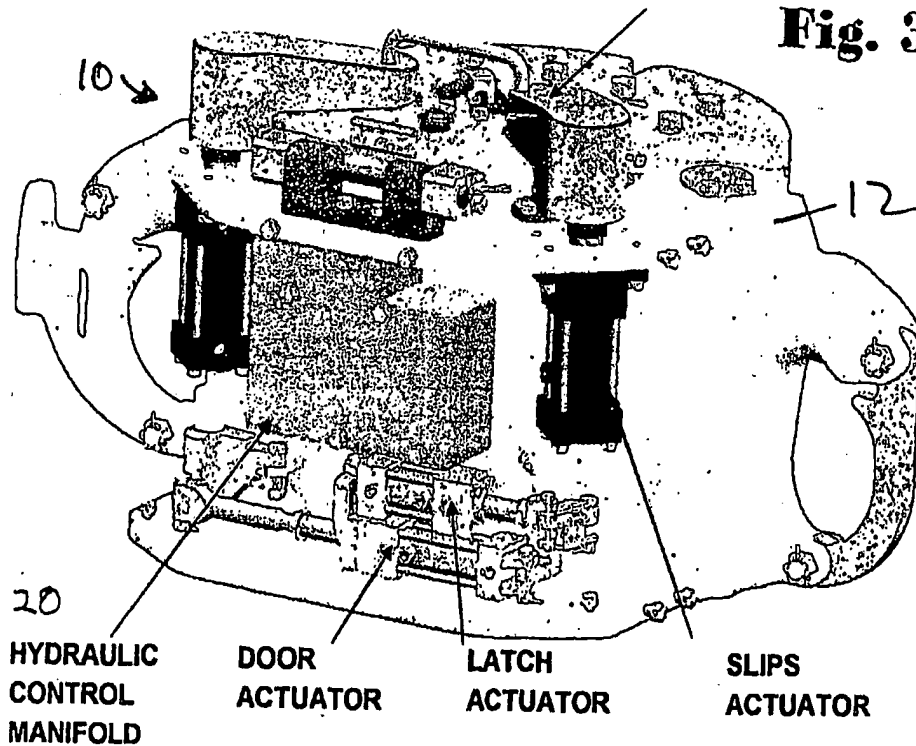
SLIPS 14

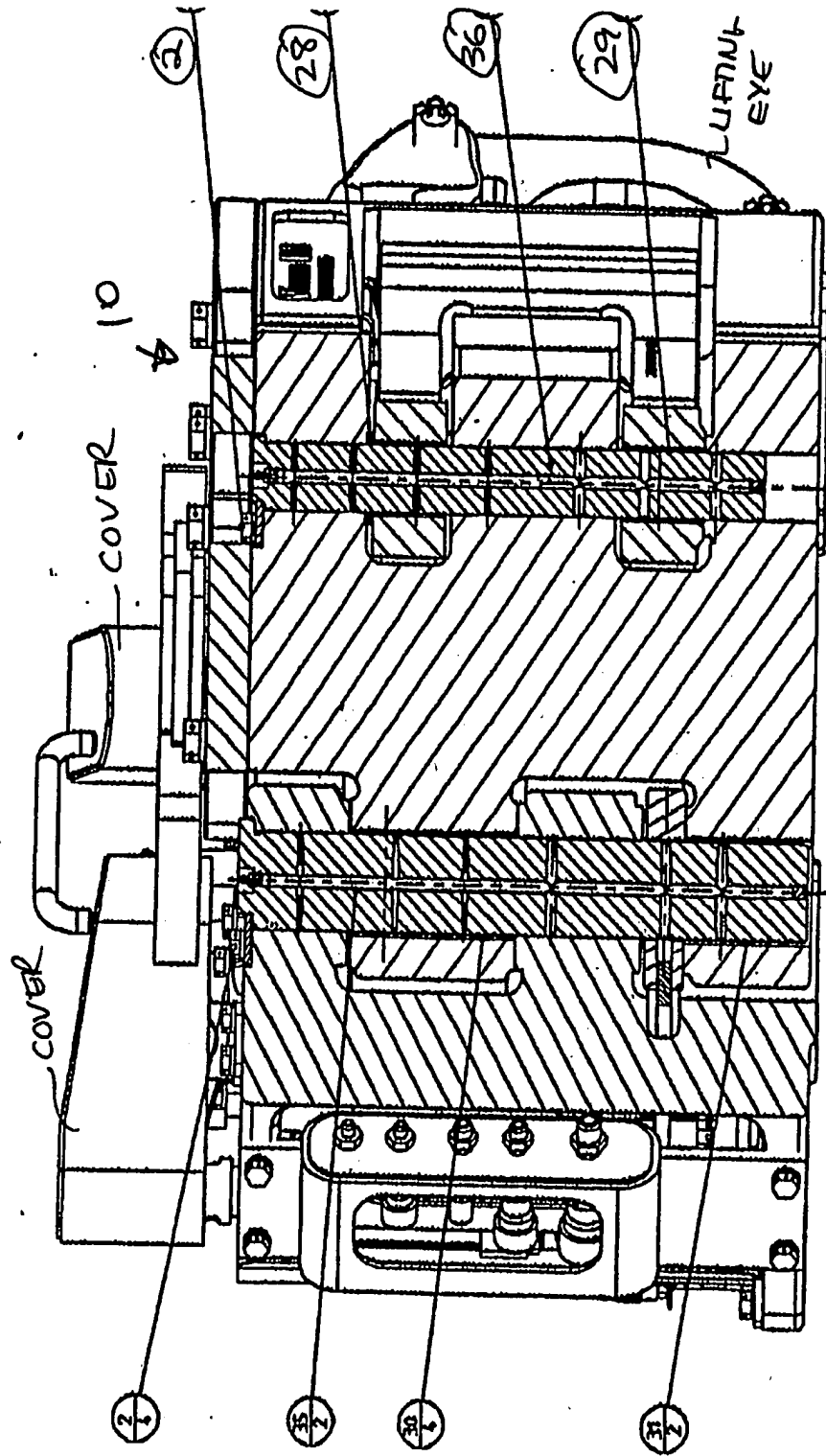
Fig. 3A

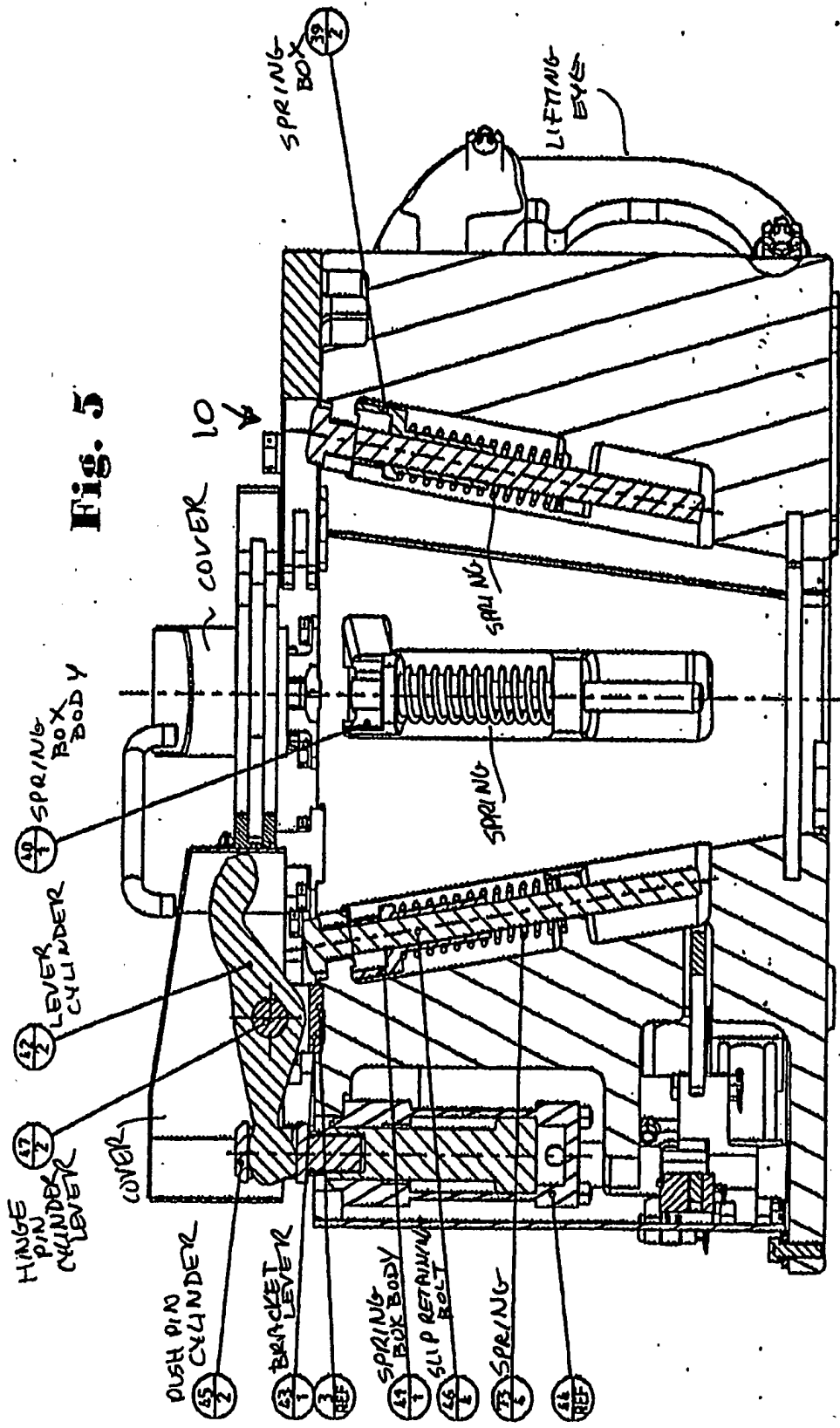


COVER

Fig. 3B







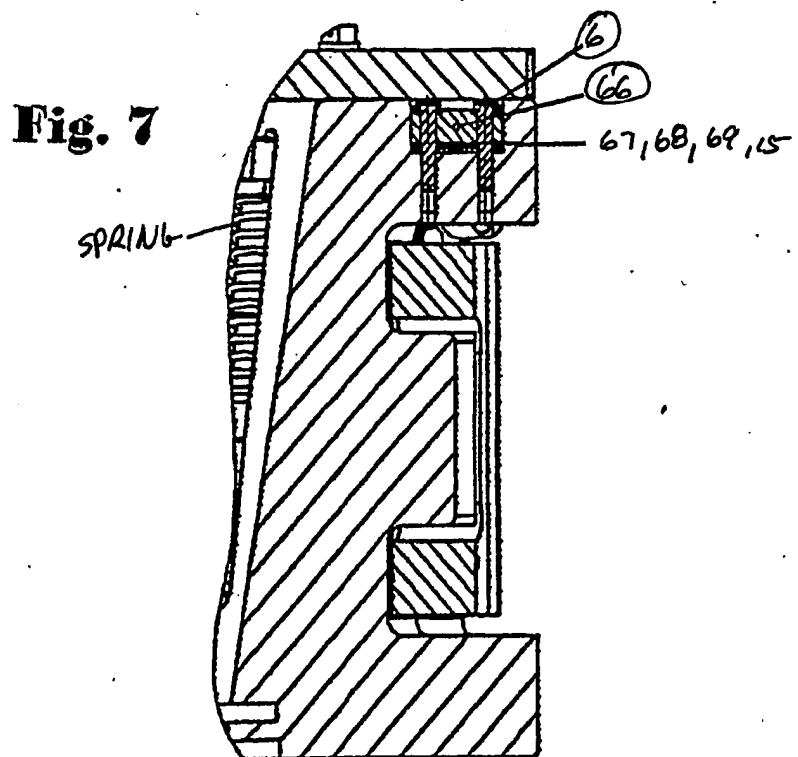
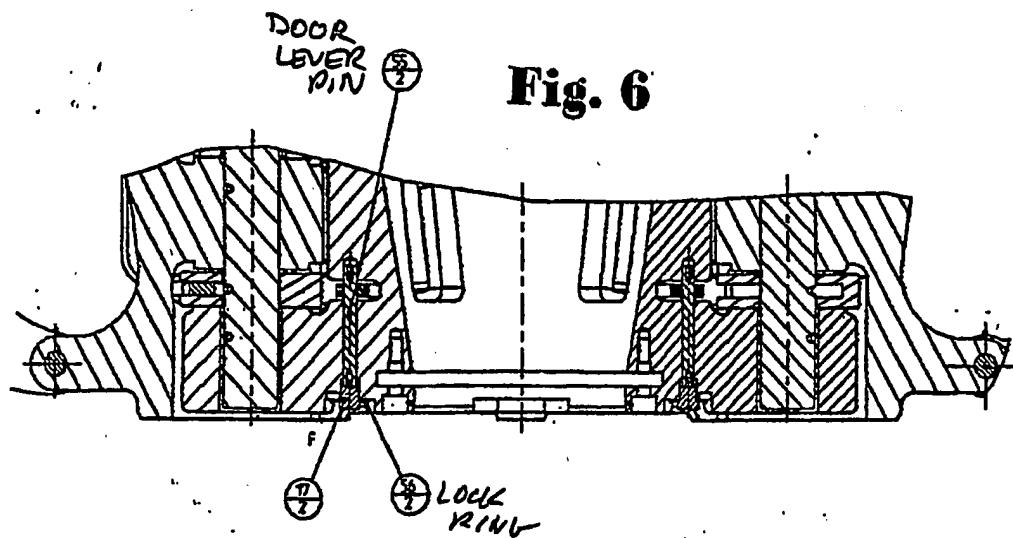


Fig. 8

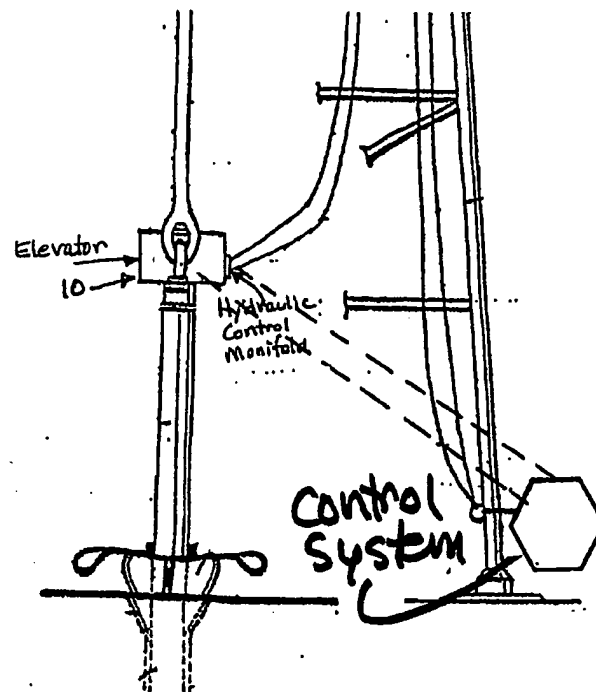
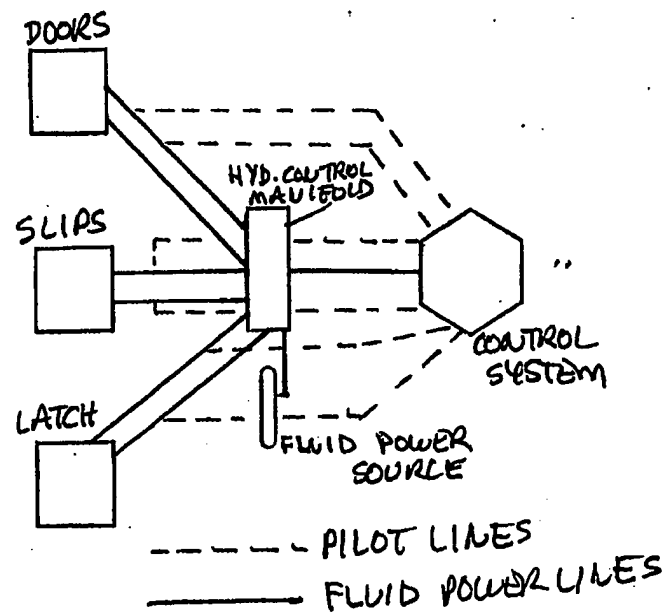
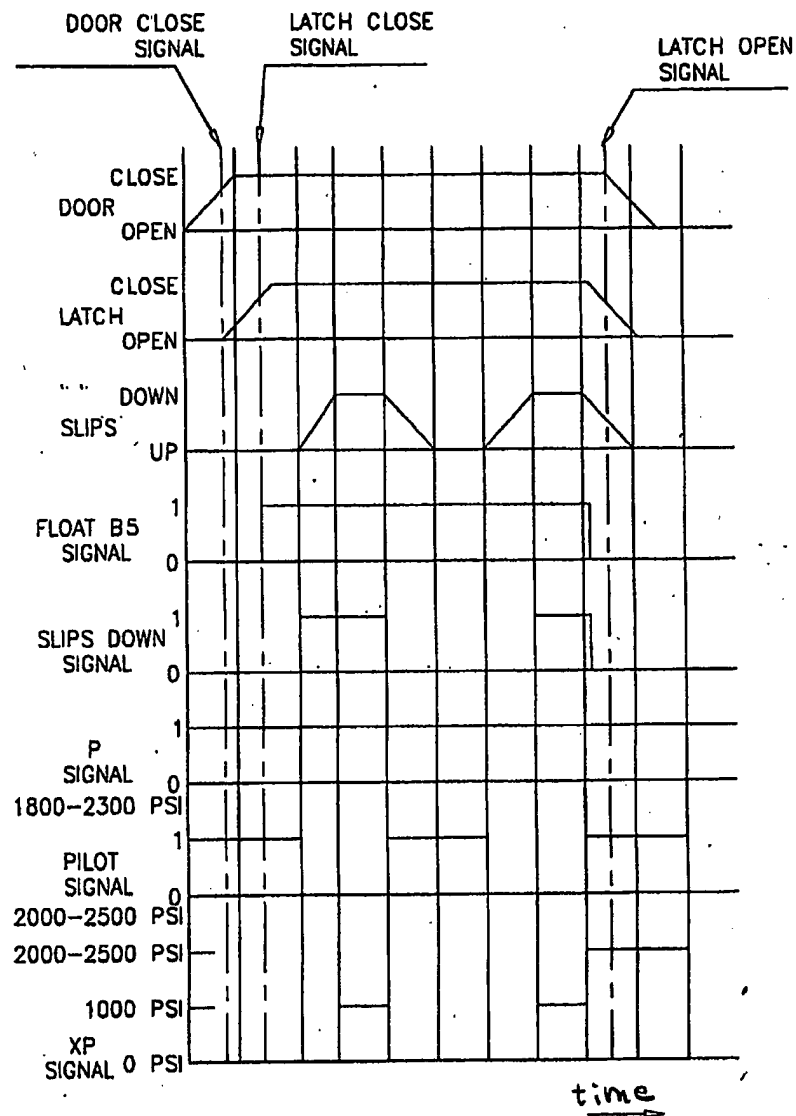


Fig. 11





PILOT OPERATION:
OPERATE THE SLIPS UP/DOWN WITH THE DOOR CLOSED & LATCHED

SEQUENCE DIAGRAM, PILOT OPERATION
SLIP TYPE ELEVATOR

Fig. 9

Fig.10

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	3	LYNCH PIN	40	1	SPRING BOX BODY RIGHT
2	10	SCREW,CAP-HEX HD (UNC 1/2")	41	1	SPRING BOX BODY LEFT
3	8	SCREW,CAP-HEX HD (UNC 1/2")	42	2	LEVER CYLINDER
4	8	SCREW,CAP-HEX HD (UNC 1/2")	43	2	Bracket Lever
5	15	SCREW,CAP-HEX HD (UNC 1/2")	44	2	CYLINDER BXS
6	2	SCREW,CAP-HEX HD (UNC 1/2")	45	2	PUSH PIN CYLINDER
7	4	SCREW,CAP-HEX HD (UNC 1/2")	46	4	SLIP RETAINING BOLT
8	6	SCREW,CAP-HEX HD (UNC 3/4")	47	2	HINGE PIN CYLINDER LEVER
9	8	NUT, HEX-SLOTTED 1/2-13	48	1	ASS'Y DOOR CYLINDER BXS
10	1	ELEVATOR	49	2	ASS'Y LEVER
11	48	WASHER, LOCK-REGULAR 0.500	50	1	ASS'Y LATCH LEVER
12	1	BODY BODY	51	2	THRUST PLATE
13	8	COTTER PIN 0.125X1.5	52	1	LEFT DOOR BRACKET MACHINING
14		SLIPS	53	1	RIGHT DOOR BRACKET MACHINING
15	2	CONNECTOR SAE O-RING 14 TO 37	54	1	ASS'Y LATCH LEVER
16	1	LATCH	55	2	DOOR LEVER PIN
17	2	PLUG, O-RING BOSS 3/4-16 UNF	56	2	LOCK RING 0.875 x 1.625
18	1	LATCH CYLINDER ASSY	57	1	ASS'Y MANIFOLD BX-S
19	1	CONTROL BRACKET LATCH	58	1	TOP COVER BXS
20	1	HYD CONTROL MANIFOLD	59	1	HINGE BLOCK
21	2	DISC LEVER PIN	60	2	LOCKPLATE HINGE PIN COVER BXS
22	7	BRACKET LEVER PIN	61	1	SHAFT COVER BXS
23	2	LOCK RING 0.875 x 1.625	62	1	LOCK BAR
24	1	PIN LATCH LEVER	63	2	WELDMENT GUIDE PLATE HOLDER DOOR
25	2	BRACKET PIN	64	1	MACHINING, BACK PLATE COVER
26	4	BUSHING 0.750	65	1	ASS'Y O.D. PLATE
27	4	LINK BLOCK BOLT	66	1	LATCH VALVE, ASS'Y FOR BX FRAME IV
28	2	RING, LATCH	67	2	SHIM 1MM FOR LATCH VALVE BX-IV
29	2	50X55X60 MM PLAIN BEARING	68	1	SHIM 2MM FOR LATCH VALVE BX-IV
30	4	75X80X60 MM PLAIN BEARING	69	1	SHIM 3MM FOR LATCH VALVE BX-IV
31	2	75X80X80 MM PLAIN BEARING	70	1	WELDMENT, ROTATOR ADAPTER BX 3 & 4
32	1	MACHINING BODY BXS	71	1	FIBERGLIDE JOURNAL BEARING CJS0808
33	1	MACHINING LEFT DOOR BXS	72	3	FIBERGLIDE JOURNAL BEARING CJS0812
34	1	MACHINING RIGHT DOOR BXS	73	4	COMPRESSION SPRING, D 13910
35	2	ASS'Y HINGE PIN DOOR BXS	74	1	LATCH CASTING BX FRAME III
36	1	ASS'Y HINGE PIN LATCH BXS			
37	2	LOCKPLATE HINGE PIN DOOR BXS			
38	1	LOCKPLATE HINGE PIN LATCH BXS			
39	2	SPRING BOX			

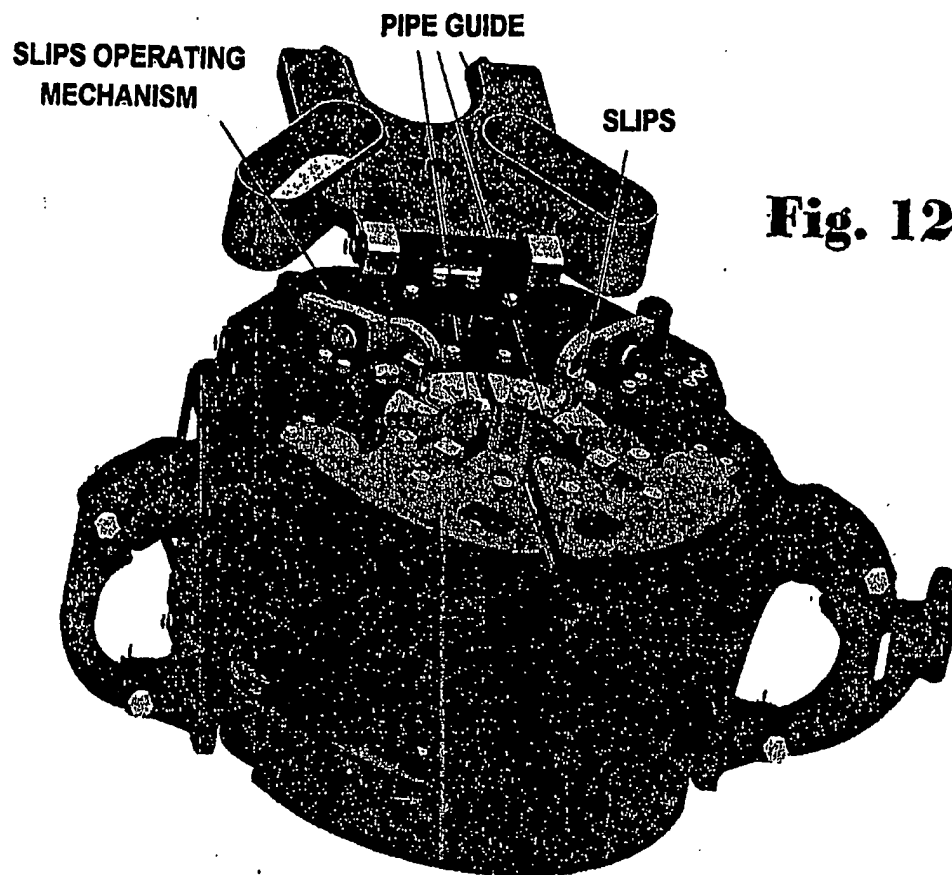


Fig. 12

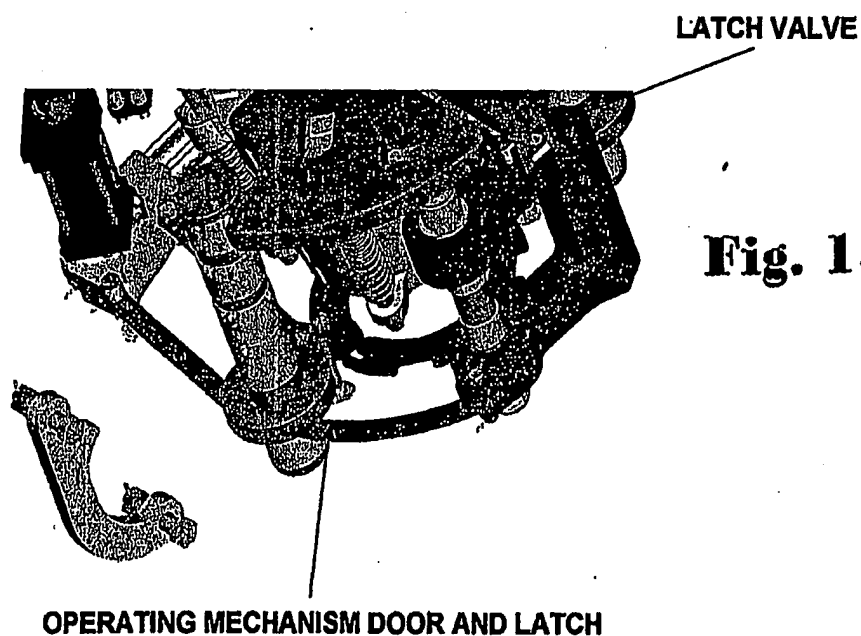


Fig. 13